

\$9.95



**POCKET
REFERENCE
CARD**

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**UNLOCK
YOUR ATARI**

**"ATARI HAS THE CAPABILITY—
ACE GIVES YOU THE KEY"**

BASIC INSTRUCTIONS

Command Abbreviation/Example Comment

COMMANDS

BYE	B.	Goes to the Memo Pad mode
CLR	CLR	Clears all variables
CONT	CON.	Continues execution
DIM	DI. A\$(30)	Reserves 30 bytes for A\$
	DI. B(17,3)	Defines an array 18 rows by 4 columns
END	END	Close files, turn off sound
LET	LE.	Defines a variable
LIST	L.	Lists a program
	L. 400,500	Lists program lines 400 thru 500
NEW	NEW	Erases a program and variables
POKE	POKE Y,X	Writes value X to memory addr Y
REM	. PROGRAM COMMENT	Comment
RUN	RU.	Begins execution of a program
STOP	STO.	Halts execution w/out closing files

PROGRAM STATEMENTS

FOR, TO STEP/NEXT	F. X=3 to 9 STEP 2 N. X	3,9,2 may be arith expressions
GOSUB RETURN	100 GOS. 300:____ 300 ? 400 RET.	RETURN goes to the statement following the colon
GOTO	G. X	X may be a variable or lineno
IF/THEN	IF Y=5 THEN 500 IF X THEN Y=6	Conditional branch X=0 is false, X > 0 is true. False goes to the next lineno
ON/GOSUB ON/GOTO	ON X GOSUB 20,30,40	If X < 1 or X > 3, it goes to the next numbered line
POP	POP	Use when RETURN is bypassed
TRAP	T. 200	Identifies the line to GOTO in the event of an error

I/O COMMANDS

CLOAD	CLOA.	Loads a program from cassette
CLOSE	C. #2	Closes a file
CSAVE	CS.	Saves a program to cassette
DOS	DO.	Displays the DOS menu
ENTER	E. "D1:MYPROG	Loads a program. Used with LIST
INPUT	I. Y\$	Receives data from the keyboard
LIST	L. "D1:MYPROG	Lists a program to a dataset
LOAD	LO. "D1:MYPROG	Loads a program. Used with SAVE
LPRINT	LP. X	Prints to a line printer
NOTE	NO. #2,A,B	Detects the sector, byte within a file
OPEN	O. #2,4,0,"D1:FILE	Open for 4=input 8=output 12=I/O
POINT	P. #3,A,B	Position on sector A, byte B within a file
PRINT	? A,B;"HERE"	Comma tabs, semicolon appends
PUT/GET	PU. #6,ASC("L") GE. #5,Y	Output a single byte Input a single byte

BASIC INSTRUCTIONS (cont.)

Command	Abbreviation/Example	Comment
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I/O COMMANDS (cont.)

READ	REA. A,B	Assigns data values
DATA	D. 5,10,16,3	Holds data values
RESTORE	RES. 350	350 is the lineno of the data for the next READ
SAVE	S. "D1:MYPROG	Saves a program. Used with LOAD
STATUS	ST. #3,A	Sets A to the device status value
XIO	XIO cmdno,#5,aux1,aux2,"S:"	See XIO COMMAND CODES

ARITHMETIC FUNCTIONS

ABS	Y=ABS(X)	Absolute value
CLOG	Y=CLOG(X)	Base 10 logarithm
EXP	Y=EXP(X)	Inverse of LOG. $Y=e^{**X}$
INT	Y=INT(X)	Integer rounds down (-4.5 TO -5)
LOG	Y=LOG(X)	Natural logarithm ($e=2.71...$)
RND	Y=RND(X)	Random number between 0 and 1
SGN	Y=SGN(X)	Evaluates sign. $Y=-1,0,+1$
SQR	Y=SQR(X)	Square root

TRIG FUNCTIONS (others are derived)

ATN	Y=ATN(X)	Inverse tangent
COS	Y=COS(X)	Cosine
SIN	Y=SIN(X)	Sine
DEG/RAD	DEG	Degrees or radians

SPECIAL FUNCTIONS

ADR	Y=ADR(X\$)	Memory address of a string
FRE	? FRE(0)	Remaining free space in RAM
PEEK	Y=PEEK(X)	Contents of memory at address X
USR	Y=USR(X)	Result of machine language program at memory addr X

STRING FUNCTIONS

ASC	Y=ASC(X\$)	ATASCII of first byte of X\$
CHR\$	Y\$=CHR\$(X)	Character with ATASCII val X
LEN	Y=LEN(X\$)	Length of a string
STR\$	Y\$=STR\$(X)	Defines a string
VAL	Y=VAL(X\$)	Evaluates a string
substring	Y\$=X\$(5,8)	Y\$ contains the fifth thru the eighth character of X\$

GRAPHIC/SOUND X increases to the right, Y increases down

GET	GE. #6,A	Inputs data from the screen
GRAPHICS	GR. M	Graphics mode.
COLOR	C. 3	Color number for PLOT or DR.
DRAWTO	DR. X,Y	Draws to a screen coordinate
LOCATE	LOC. X,Y,A	Sets A to the COLOR number of screen coordinate X,Y
PLOT	PL. X,Y	Plots a graphic point
POSITION	POS. X,Y	Positions cursor
PUT	PU. #6,A	Outputs data to the screen
SETCOLOR	SE. 1,2,4	Color reg, hue, luminance
SOUND	SO. 1,100,10,4	Voice(0-3), pitch(0-255), distortion(0-14 even), volume(0-15)
XIO	X. 18,#6,0,0,"S:"	XIO FILL from memory loc 765

BASIC INSTRUCTIONS (cont.)

Command Abbreviation/Example Comment

CONTROLLER FUNCTIONS

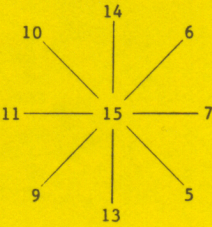
PADDLE	Y=PADDLE(X)	X=0 to 7, Y=0 to 228
PTRIG	Y=PTRIG(X)	X=0 to 7, Y=0 (trig pressed) Y=1 (not pressed)
STICK	Y=STICK(X)	X=0 to 3, Y=see JOYSTICK
STRIG	Y=STRIG(X)	X=0 to 3, Y=0 (trig pressed) Y=1 (not pressed)

XIO COMMAND CODES

CODE OPERATION

3	OPEN
5	GET RECORD
7	GET CHARACTERS
9	PUT RECORD
11	PUT CHARACTERS
12	CLOSE
13	STATUS REQUEST
17	DRAW LINE
18	FILL
32	RENAME
33	DELETE
35	LOCK FILE
36	UNLOCK FILE
37	POINT
38	NOTE
254	FORMAT

JOYSTICK MOVEMENT (STICK values)



SOUND COMMAND PITCH VALUES

OCTAVE	-3	-2	-1	0	+1	+2	+3
DISTORT	12	12	10	10	10	10	10
B	67	33	128	64	31		
A#	72	36	136	68	33	16	
A	75	37	144	72	35		
G#	82	40	153	76	37	18	
G	85	42	162	81	40		
F#	90	45	173	85	42		
F	98	48	182	91	45		
E	102	51	193	96	47	23	
D#		55	204	102	50		
D		57	217	108	53	26	
C#		60	230	114	57		
C		63	243	121	60	29	14

The C in octave 0 is Middle C.

PLAYER-MISSILE AREA LAYOUT

Double Line Resolution

PMBASE
Mult of 1024

PMBASE +384	
PMBASE +512	MISSILES
PMBASE +640	PLAYER 0
PMBASE +768	PLAYER 1
PMBASE +896	PLAYER 2
PMBASE +1024	PLAYER 3

Single Line Resolution

PMBASE
Mult of 2048

PMBASE +768	
PMBASE +1024	MISSILES
PMBASE +1280	PLAYER 0
PMBASE +1536	PLAYER 1
PMBASE +1792	PLAYER 2
PMBASE +2048	PLAYER 3

6502 ASSEMBLER LANGUAGE MNEMONICS

CODE OPERATION

ADC	Add memory to accumulator with carry
AND	AND memory with accumulator
ASL	Shift left one bit
BCC	Branch on carry clear
BCS	Branch on carry set
BEQ	Branch on result zero
BIT	Test bits in accumulator with memory
BMI	Branch on result minus
BNE	Branch on result not zero
BPL	Branch on result plus
BRK	Force break
BVC	Branch on overflow clear
BVS	Branch on overflow set
CLC	Clear carry flag
CLD	Clear decimal mode
CLI	Clear interrupt disable flag
CLV	Clear overflow flag
CMP	Compare memory and accumulator
CPX	Compare memory and index X
CPY	Compare memory and index Y
DEC	Decrement memory by one
DEX	Decrement index X by one
DEY	Decrement index Y by one
EOR	Exclusive OR memory with accumulator
INC	Increment memory by one
INX	Increment index X by one
INY	Increment index Y by one
JMP	Jump to new location
JSR	Jump to new location save return address
LDA	Load accumulator from memory
LDX	Load index X from memory
LDY	Load index Y from memory
LSR	Shift right one bit
NOP	No operation
ORA	OR memory with accumulator
PHA	Push accumulator on stack
PHP	Push processor status on stack
PLA	Pull accumulator from stack
PLP	Pull processor status from stack
ROL	Rotate one bit left
ROR	Rotate one bit right
RTI	Return from interrupt
RTS	Return from subroutine
SBC	Subtract memory and borrow from accumulator
SEC	Set carry flag
SED	Set decimal mode
SEI	Set interrupt disable flag
STA	Store accumulator in memory
STX	Store index X in memory
STY	Store index Y in memory
TAX	Transfer accumulator to index X
TAY	Transfer accumulator to index Y
TSX	Transfer stack pointer to index X
TXA	Transfer index X to accumulator
TXS	Transfer index X to stack pointer
TYA	Transfer index Y to accumulator

SYMBOLIC DEVICE NAMES

SYMBOL	DEVICE	I/O	IOCB
C:	Cassette tape unit	I/O	#7
D:	Same as D1:	I/O	
D1:,D2:,D3:,D4:	Disk units 1-4	I/O	
E:	Screen Editor	I/O	#0
K:	Keyboard	I	
P:	Printer	O	
R:	RS-232 Interface	I/O	
S:	Screen	I/O	#6

FREQUENTLY USED PEEK/POKE ADDRESSES

LABEL	DECIMAL	HEX	R DESCRIPTION
RTCLOCK	18-20	12-14	TV frame counter (LSB-MSB)
ATTRACT	77	4D	Zero to suppress the attract mode
LMARGIN	82	52	Left screen margin. Default 2
RMARGIN	83	53	Right screen margin. Default 39
GRMODE	87	57	Graphic mode number
RAMTOP	106	6A	Top of RAM in pages
STARD	140-1	8C-D	Points to the string array table
STOPLN	186-7	BA-B	Line number of STOP or TRAP
ERRSAV	195	C3	Error Number
FR0	212-3	D4-5	Value returned by USR (LSB-MSB)
SDMCTL	559	022F	Shadow for Direct Memory Access CTL Register. Playfield size: 1=narrow, 2=std, 3=wide. Missile DMA=4, player DMA=8. Player resolution: 0=double line, 16=single line, DMA enable=32 (this bit must be on)
SDLSTL	560-1	0230-1	Points to the display list (LSB-MSB)
GPRIOR	623	023F	PM priority: 1 = P0-3, PF0-3, BAK 2 = P0-1, PF0-3, P2-3, BAK 4 = PF0-3, P0-3, BAK 8 = PF0, PF1, P0-P3, PF2-3, BAK 16 = 5th player 32 = 3rd color
TXTROW	656	0290	Text cursor row
TXTCOL	657-8	0291-2	Text cursor column
PCOLR0	704	02C0	Color of player/missile 0
PCOLR1	705	02C1	Color of player/missile 1
PCOLR2	706	02C2	Color of player/missile 2
PCOLR3	707	02C3	Color of player/missile 3
PF0	708	02C4	Color register 0
PF1	709	02C5	Color register 1
PF2	710	02C6	Color register 2
PF3	711	02C7	Color register 3
BAK	712	02C8	Color register 4
CRSINH	752	02F0	Cursor inhibit 0=cursor on, 1=off
CHBAS	756	02F4	Character base register
CH	764	02FC	Internal code of the last key pressed
HPOSP0 MOPF	53248	D000	W Horizontal position of player 0 R Missile 0/playfield collision
HPOSP1 M1PF	53249	D001	W Horizontal position of player 1 R Missile 1/playfield collision
HPOSP2 M2PF	53250	D002	W Horizontal position of player 2 R Missile 2/playfield collision
HPOSP3 M3PF	53251	D003	W Horizontal position of player 3 R Missile 3/playfield collision

FREQUENTLY USED PEEK/POKE ADDRESSES

LABEL	DECIMAL	HEX	R DESCRIPTION
HPOSM0 POPF	53252	D004	W Horizontal position of missile 0 R Player 0/playfield collision
HPOSM1 P1PF	53253	D005	W Horizontal position of missile 1 R Player 1/playfield collision
HPOSM2 P2PF	53254	D006	W Horizontal position of missile 2 R Player 2/playfield collision
HPOSM3 P3PF	53255	D007	W Horizontal position of missile 3 R Player 3/playfield collision
SIZEP0 MOPL	53256	D008	W Size of player 0. 1=2X, 3=4X R Missile 0 to player collision
SIZEP1 M1PL	53257	D009	W Size of player 1. 1=2X, 3=4X R Missile 1 to player collision
SIZEP2 M2PL	53258	D00A	W Size of player 2. 1=2X, 3=4X R Missile 2 to player collision
SIZEP3 M3PL	53259	D00B	W Size of player 3. 1=2X, 3=4X R Missile 3 to player collision
SIZEM POPL	53260	D00C	W Missile size. 1=2X, 3=4X R Player 0 to player collision
P1PL	53261	D00D	R Player 1 to player collision
P2PL	53262	D00E	R Player 2 to player collision
P3PL	53263	D00F	R Player 3 to player collision
GRACCTL	53277	D01D	W 1=Missile DMA, 2=Player DMA
HITCLR	53278	D01E	W Any number clears collision registers
PMBASE	54278-9	D406-7	Player missile base addr.
WSYNC	54282	D40A	W Wait for horizontal sync
VCOUNT	54283	D40B	R Vertical TV scan line counter
NMIEN	54286	D40E	W Non-maskable interrupt enable (192 for DLI)

COLOR REGISTER VALUES

COLOR	SETCOLOR HUE	ADD-VALUE
gray	0	0
light orange	1	16
orange	2	32
red-orange	3	48
pink	4	64
purple	5	80
purple-blue	6	96
blue	7	112
blue	8	128
light blue	9	144
turquoise	10	160
green-blue	11	176
green	12	192
yellow-green	13	208
orange-green	14	224
light orange	15	240

For SETCOLOR A,B,C the contents of

$$\begin{aligned} \text{Color Reg A} &= (\text{ADD-VALUE of B}) + C \\ &= (B * 16) + C \end{aligned}$$

ERROR MESSAGES

Code Message

- 2 Insufficient memory for a statement, variable, or DIM
- 3 A value is outside its expected range
- 4 More than 128 variables have been defined
- 5 A string exceeded its dimensioned length
- 6 A READ occurred for which there was no DATA
- 7 A value is not a positive integer or exceeds 32767
- 8 Attempted to INPUT a non-numeric value into a variable which is not a dimensioned string
- 9 DIM size exceeds 32767, or a subscript exceeds the dimensioned size of the array, or the array or string has already been dimensioned, or was never dimensioned
- 10 Too many nested GOSUB's. The argument stack has overflowed.
- 11 Floating point under/overflow. Attempted to divide by zero or refer to number less than 10^{-99} or greater than 10^{98}
- 12 The referenced line number does not exist
- 13 NEXT with no corresponding FOR
- 14 The statement is too long or too complex
- 15 NEXT or RETURN relates to a FOR or GOSUB which has been deleted
- 16 RETURN with no corresponding GOSUB
- 17 An invalid machine instruction or address was encountered
- 18 A string begins with an invalid value, or a VAL string is not numeric
- 19 Insufficient memory to load the program
- 20 Invalid device number
- 21 Attempted to LOAD a non-LOAD file
- 128 A BREAK occurred during I/O
- 129 The IOCB is already open
- 130 The specified device does not exist
- 131 READ attempted to a write-only device
- 132 Invalid I/O command
- 133 The file or device is not OPEN
- 134 Invalid IOCB number
- 135 WRITE attempted to a read-only device
- 136 End of file
- 137 Attempted to read a record longer than 256
- 138 Device did not respond to the I/O commands
- 139 I/O error or faulty disk drive
- 140 Serial bus input framing error

ERROR MESSAGES

Code Message

141	Cursor exceeded the range of the graphics mode
142	Serial bus data frame overrun
143	Serial bus data frame checksum error
144	Attempted to write to a write-protected diskette
145	Read after write compare error
146	Function not implemented in handler
147	Insufficient memory for the selected graphics mode
160	Drive number error
161	Too many files are OPEN
162	No more freespace on diskette
163	Unrecoverable system data I/O error
164	File number mismatch
165	File name error
166	POINT data length error
167	File is locked
168	Invalid or privileged instruction
169	Disk volume-table-of-contents is full (64 files)
170	File not found
171	POINT invalid

REFERENCE CARD LEGENDS & ABBREVIATIONS

CODE TRANSLATION TABLE

Dec	Decimal number
Hex	Hexadecimal
Chars	ATASCII display and control characters. Vertical lines bounding this column indicate reverse video
Int	Internal keyboard code: PEEK(764)
aec	Control keys pressed: ATARI, ESCAPE, CNTL/SHIFT
Key	Keyboard key cap
Asm	6502 Assembler Mnemonic
Addr Mode	Machine language address mode abbreviations: ABS=absolute, PG=page, IDX=indexed, INDIR=indirect, ACCUM=accumulator, IMMED=immediate

CONTROL CHARACTER DISPLAY

ASC	ATASCII
aec	Control keys pressed: ATARI, ESCAPE, CNTL/SHIFT
Key	Keyboard key cap
Display	Vertical lines bounding this column indicate reverse video

DEFAULT CHARACTER SET

CH#	The relative character number within the set
REG 0-3	Playfield color registers 0 thru 3
ASC	ATASCII
aec	Control keys pressed: ATARI, ESCAPE, CNTL/SHIFT
Key	Keyboard key cap

FREQUENTLY USED PEEK/POKE ADDRESSES

R,W	Read-only or write-only
-----	-------------------------

WHAT IF YOU COULD...

- sample every sound your ATARI makes!
- see the sound command and note (if any) while you listen!
- sample every color combination in each Graphics mode!
- see the color register command while you watched
- do all this with your joystick - IN MINUTES!!
- get both of these programs for only \$19.95!

YOU CAN!!

colortrack &
soundtrack

Takes the guess
work out of color
& sound for your
ATARI 400 or 800!

BOTH

\$19.95
(CASSETTE) 16k

\$29.95
(ACE DISK II) 24k

NOTES:

**For more fine ATARI products
visit your local dealer.**



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CODE TRANSLATION TABLE

Dec	Hex	Chars	Int	aec	Key	Asm	Addr Mode	Binary
0	00	♥	160	c	,	BRK	IMPLIED	00000000
1	01	┐	191	c	A	ORA	IDX INDIR	00000001
2	02	┌	149	c	B			00000010
3	03	└	146	c	C			00000011
4	04	┌	186	c	D			00000100
5	05	└	170	c	E	ORA	ZERO PG	00000101
6	06	└	184	c	F	ASL	ZERO PG	00000110
7	07	└	189	c	G			00000111
8	08	▲	185	c	H	PHP	IMPLIED	00001000
9	09	■	141	c	I	ORA	IMMED	00001001
10	0A	▴	129	c	J	ASL	ACCUM	00001010
11	0B	▴	133	c	K			00001011
12	0C	■	128	c	L			00001100
13	0D	▬	165	c	M	ORA	ABS	00001101
14	0E	▬	163	c	N	ASL	ABS	00001110
15	0F	■	136	c	O			00001111
16	10	♠	138	c	P	BPL	RELATIVE	00010000
17	11	└	175	c	Q	ORA	INDIR IDX	00010001
18	12	▬	168	c	R			00010010
19	13	+	190	c	S			00010011
20	14	●	173	c	T			00010100
21	15	■	139	c	U	ORA	ZERO PG X	00010101
22	16	└	144	c	V	ASL	ZERO PG X	00010110
23	17	└	174	c	W			00010111
24	18	└	150	c	X	CLC	IMPLIED	00011000
25	19	└	171	c	Y	ORA	ABS Y	00011001
26	1A	└	151	c	Z			00011010
27	1B	escape	28		ESC			00011011
28	1C	cursup	142	c	-			00011100
29	1D	cursdn	143	c	=	ORA	ABS X	00011101
30	1E	curslt	134	c	+	ASL	ABS X	00011110
31	1F	cursrt	135	c	*			00011111
32	20	space	33		SPC	JSR	ABS	00100000
33	21	!	95		!	AND	IDX INDIR	00100001
34	22	"	94		"			00100010
35	23	#	90		#			00100011
36	24	\$	88		\$	BIT	ZERO PG	00100100
37	25	%	93		%	AND	ZERO PG	00100101
38	26	&	91		&	ROL	ZERO PG	00100110
39	27	'	115		'			00100111
40	28	(	112		(	PLP	IMPLIED	00101000
41	29	)	114		)	AND	IMMED	00101001
42	2A	*	7		*	ROL	ACCUM	00101010
43	2B	+	6		+			00101011
44	2C	,	32		,	BIT	ABS	00101100
45	2D	-	14		-	AND	ABS	00101101
46	2E	.	34		.	ROL	ABS	00101110
47	2F	/	38		/			00101111
48	30	0	50		0	BMI	RELATIVE	00110000
49	31	1	31		1	AND	INDIR IDX	00110001
50	32	2	30		2			00110010
51	33	3	26		3			00110011
52	34	4	24		4			00110100
53	35	5	29		5	AND	ZERO PG X	00110101
54	36	6	27		6	ROL	ZERO PG X	00110110
55	37	7	51		7			00110111
56	38	8	53		8	SEC	IMPLIED	00111000
57	39	9	48		9	AND	ABS Y	00111001
58	3A	:	66		:			00111010
59	3B	;	2		;			00111011
60	3C	<	54		<			00111100
61	3D	=	15		=	AND	ABS X	00111101
62	3E	>	55		>	ROL	ABS X	00111110
63	3F	?	102		?			00111111

CODE TRANSLATION TABLE

Dec	Hex	Chars	Int	aec	Key	Asm	Addr Mode	Binary
64	40	@	117		@	RTI	IMPLIED	01000000
65	41	A	63		A	EOR	IDX INDIR	01000001
66	42	B	21		B			01000010
67	43	C	18		C			01000011
68	44	D	58		D			01000100
69	45	E	42		E	EOR	ZERO PG	01000101
70	46	F	56		F	LSR	ZERO PG	01000110
71	47	G	61		G			01000111
72	48	H	57		H	PHA	IMPLIED	01001000
73	49	I	13		I	EOR	IMMED	01001001
74	4A	J	1		J	LSR	ACCUM	01001010
75	4B	K	5		K			01001011
76	4C	L	0		L	JMP	ABS	01001100
77	4D	M	37		M	EOR	ABS	01001101
78	4E	N	35		N	LSR	ABS	01001110
79	4F	O	8		O			01001111
80	50	P	10		P	BVC	RELATIVE	01010000
81	51	Q	47		Q	EOR	INDIR IDX	01010001
82	52	R	40		R			01010010
83	53	S	62		S			01010011
84	54	T	45		T			01010100
85	55	U	11		U	EOR	ZERO PG X	01010101
86	56	V	16		V	LSR	ZERO PG X	01010110
87	57	W	46		W			01010111
88	58	X	22		X	CLI	IMPLIED	01011000
89	59	Y	43		Y	EOR	ABS Y	01011001
90	5A	Z	23		Z			01011010
91	5B	_	96		_			01011011
92	5C	\	70		\			01011100
93	5D	]	98		]	EOR	ABS X	01011101
94	5E	^	71		^	LSR	ABS X	01011110
95	5F	_	78		_			01011111
96	60	◆	162	c	•	RTS	IMPLIED	01100000
97	61	a	63		a	ADC	IDX INDIR	01100001
98	62	b	21		b			01100010
99	63	c	18		c			01100011
100	64	d	58		d			01100100
101	65	e	42		e	ADC	ZERO PG	01100101
102	66	f	56		f	ROR	ZERO PG	01100110
103	67	g	61		g			01100111
104	68	h	57		h	PLA	IMPLIED	01101000
105	69	i	13		i	ADC	IMMED	01101001
106	6A	j	1		j	ROR	ACCUM	01101010
107	6B	k	5		k			01101011
108	6C	l	0		l	JMP	INDIRECT	01101100
109	6D	m	37		m	ADC	ABS	01101101
110	6E	n	35		n	ROR	ABS	01101110
111	6F	o	8		o			01101111
112	70	p	10		p	BVS	RELATIVE	01110000
113	71	q	47		q	ADC	INDIR IDX	01110001
114	72	r	40		r			01110010
115	73	s	62		s			01110011
116	74	t	45		t			01110100
117	75	u	11		u	ADC	ZERO PG X	01110101
118	76	v	16		v	ROR	ZERO PG X	01110110
119	77	w	46		w			01110111
120	78	x	22		x	SEI	IMPLIED	01111000
121	79	y	43		y	ADC	ABS Y	01111001
122	7A	z	23		z			01111010
123	7B	●	130	c	;			01111011
124	7C		79					01111100
125	7D	clear	118	s	CLR	ADC	ABS X	01111101
126	7E	bkspac	52		DEL	ROR	ABS X	01111110
127	7F	tab	44		TAB			01111111

CODE TRANSLATION TABLE

Dec	Hex	Chars	Int	aec	Key	Asm	Addr	Mode	Binary
128	80	♥	96	a c	,				10000000
129	81	┐	191	a c	A	STA	IDX	INDIR	10000001
130	82	└	149	a c	B				10000010
131	83	┌	146	a c	C				10000011
132	84	└┐	186	a c	D	STY	ZERO	PG	10000100
133	85	└┐	170	a c	E	STA	ZERO	PG	10000101
134	86	└┐	184	a c	F	STX	ZERO	PG	10000110
135	87	└┐	189	a c	G				10000111
136	88	▀	185	a c	H	DEY	IMPLIED		10001000
137	89	▀	141	a c	I				10001001
138	8A	▀	129	a c	J	TXA	IMPLIED		10001010
139	8B	▀	133	a c	K				10001011
140	8C	▀	128	a c	L	STY	ABS		10001100
141	8D	▀	165	a c	M	STA	ABS		10001101
142	8E	▀	163	a c	N	STX	ABS		10001110
143	8F	▀	136	a c	O				10001111
144	90	♠	138	a c	P	BCC	RELATIVE		10010000
145	91	└┐	175	a c	Q	STA	INDIR	IDX	10010001
146	92	└┐	168	a c	R				10010010
147	93	└┐	190	a c	S				10010011
148	94	●	173	a c	T	STY	ZERO	PG X	10010100
149	95	▀	139	a c	U	STA	ZERO	PG X	10010101
150	96	▀	144	a c	V	STX	ZERO	PG Y	10010110
151	97	└┐	174	a c	W				10010111
152	98	└┐	150	a c	X	TYA	IMPLIED		10011000
153	99	▀	171	a c	Y	STA	ABS	Y	10011001
154	9A	└┐	151	a c	Z	TXS	IMPLIED		10011010
155	9B	return	12		RTN				10011011
156	9C	dletln	116	s	DEL				10011100
157	9D	isrtln	119	s	INS	STA	ABS	X	10011101
158	9E	clrtab	172	c	TAB				10011110
159	9F	settab	108	s	TAB				10011111
160	A0	space	33	a	SPC	LDY	IMMED		10100000
161	A1	!	95	a	!	LDA	IDX	INDIR	10100001
162	A2	"	94	a	"	LDX	IMMED		10100010
163	A3	#	90	a	#				10100011
164	A4	\$	88	a	\$	LDY	ZERO	PG	10100100
165	A5	%	93	a	%	LDA	ZERO	PG	10100101
166	A6	&	91	a	&	LDX	ZERO	PG	10100110
167	A7	'	115	a	'				10100111
168	A8	(	112	a	(	TAY	IMPLIED		10101000
169	A9	)	114	a	)	LDA	IMMED		10101001
170	AA	*	7	a	*	TAX	IMPLIED		10101010
171	AB	+	6	a	+				10101011
172	AC	,	32	a	,	LDY	ABS		10101100
173	AD	-	14	a	-	LDA	ABS		10101101
174	AE	.	34	a	.	LDX	ABS		10101110
175	AF	/	38	a	/				10101111
176	B0	0	50	a	0	BCS	RELATIVE		10110000
177	B1	1	31	a	1	LDA	INDIR	IDX	10110001
178	B2	2	30	a	2				10110010
179	B3	3	26	a	3				10110011
180	B4	4	24	a	4	LDY	ZERO	PG X	10110100
181	B5	5	29	a	5	LDA	ZERO	PG X	10110101
182	B6	6	27	a	6	LDX	ZERO	PG Y	10110110
183	B7	7	51	a	7				10110111
184	B8	8	53	a	8	CLV	IMPLIED		10111000
185	B9	9	48	a	9	LDA	ABS	Y	10111001
186	BA	:	66	a	:	TSX	IMPLIED		10111010
187	BB	;	2	a	;				10111011
188	BC	<	54	a	<	LDY	ABS	X	10111100
189	BD	=	15	a	=	LDA	ABS	X	10111101
190	BE	>	55	a	>	LDX	ABS	Y	10111110
191	BF	?	102	a	?				10111111

CODE TRANSLATION TABLE

Dec	Hex	Chars	Int	aec	Key	Asm	Addr Mode	Binary
192	C0	@	117	a	@	CPY	IMMED	11000000
193	C1	A	63	a	A	CMP	IDX INDIR	11000001
194	C2	B	21	a	B			11000010
195	C3	C	18	a	C			11000011
196	C4	D	58	a	D	CPY	ZERO PG	11000100
197	C5	E	42	a	E	CMP	ZERO PG	11000101
198	C6	F	56	a	F	DEC	ZERO PG	11000110
199	C7	G	61	a	G			11000111
200	C8	H	57	a	H	INY	IMPLIED	11001000
201	C9	I	13	a	I	CMP	IMMED	11001001
202	CA	J	1	a	J	DEX	IMPLIED	11001010
203	CB	K	5	a	K			11001011
204	CC	L	0	a	L	CPY	ABS	11001100
205	CD	M	37	a	M	CMP	ABS	11001101
206	CE	N	35	a	N	DEC	ABS	11001110
207	CF	O	8	a	O			11001111
208	D0	P	10	a	P	BNE	RELATIVE	11010000
209	D1	Q	47	a	Q	CMP	INDIR IDX	11010001
210	D2	R	40	a	R			11010010
211	D3	S	62	a	S			11010011
212	D4	T	45	a	T			11010100
213	D5	U	11	a	U	CMP	ZERO PG X	11010101
214	D6	V	16	a	V	DEC	ZERO PG X	11010110
215	D7	W	46	a	W			11010111
216	D8	X	22	a	X	CLD	IMPLIED	11011000
217	D9	Y	43	a	Y	CMP	ABS Y	11011001
218	DA	Z	23	a	Z			11011010
219	DB	[	96	a	[			11011011
220	DC	\	70	a	\			11011100
221	DD	]	98	a	]	CMP	ABS X	11011101
222	DE	^	71	a	^	DEC	ABS X	11011110
223	DF	_	78	a	_			11011111
224	E0	◆	162	a c	•	CPX	IMMED	11100000
225	E1	a	63	a	a	SBC	IDX INDIR	11100001
226	E2	b	21	a	b			11100010
227	E3	c	18	a	c			11100011
228	E4	d	58	a	d	CPX	ZERO PG	11100100
229	E5	e	42	a	e	SBC	ZERO PG	11100101
230	E6	f	56	a	f	INC	ZERO PG	11100110
231	E7	g	61	a	g			11100111
232	E8	h	57	a	h	INX	IMPLIED	11101000
233	E9	i	13	a	i	SBC	IMMED	11101001
234	EA	j	1	a	j	NOP	IMPLIED	11101010
235	EB	k	5	a	k			11101011
236	EC	l	0	a	l	CPX	ABS	11101100
237	ED	m	37	a	m	SBC	ABS	11101101
238	EE	n	35	a	n	INC	ABS	11101110
239	EF	o	8	a	o			11101111
240	F0	p	10	a	p	BEQ	RELATIVE	11110000
241	F1	q	47	a	q	SPC	INDIR IDX	11110001
242	F2	r	40	a	r			11110010
243	F3	s	62	a	s			11110011
244	F4	t	45	a	t			11110100
245	F5	u	11	a	u	SBC	ZERO PG X	11110101
246	F6	v	16	a	v	INC	ZERO PG X	11110110
247	F7	w	46	a	w			11110111
248	F8	x	22	a	x	SED	IMPLIED	11111000
249	F9	y	43	a	y	SBC	ABS Y	11111001
250	FA	z	23	a	z			11111010
251	FB	◆	130	a c	;			11111011
252	FC		79	a				11111100
253	FD	bell	158	c	2	SBC	ABS X	11111101
254	FE	dltch	180	c	DEL	INC	ABS X	11111110
255	FF	isrtch	183	c	INS			11111111

DEFAULT CHARACTER SETS: 1=POKE 756,224 2=POKE 756,226

DISPLAY		REG 0	REG 1		REG 2		REG 3	
CH#	1 2	ASC Key	ASC aec Key		ASC aec Key		ASC aec Key	
0	♥	32 SPC	0 c ,		160 a SPC		128 a c ,	
1	!	33 !	1 c A		161 a !		129 a c A	
2	"	34 "	2 c B		162 a "		130 a c B	
3	#	35 #	3 c C		163 a #		131 a c C	
4	\$	36 \$	4 c D		164 a \$		132 a c D	
5	%	37 %	5 c E		165 a %		133 a c E	
6	&	38 &	6 c F		166 a &		134 a c F	
7	'	39 '	7 c G		167 a '		135 a c G	
8	(	40 (	8 c H		168 a (		136 a c H	
9	)	41)	9 c I		169 a)		137 a c I	
10	*	42 *	10 c J		170 a *		138 a c J	
11	+	43 +	11 c K		171 a +		139 a c K	
12	,	44 ,	12 c L		172 a ,		140 a c L	
13	-	45 -	13 c M		173 a -		141 a c M	
14	.	46 .	14 c N		174 a .		142 a c N	
15	/	47 /	15 c O		175 a /		143 a c O	
16	0	48 0	16 c P		176 a 0		144 a c P	
17	1	49 1	17 c Q		177 a 1		145 a c Q	
18	2	50 2	18 c R		178 a 2		146 a c R	
19	3	51 3	19 c S		179 a 3		147 a c S	
20	4	52 4	20 c T		180 a 4		148 a c T	
21	5	53 5	21 c U		181 a 5		149 a c U	
22	6	54 6	22 c V		182 a 6		150 a c V	
23	7	55 7	23 c W		183 a 7		151 a c W	
24	8	56 8	24 c X		184 a 8		152 a c X	
25	9	57 9	25 c Y		185 a 9		153 a c Y	
26	:	58 :	26 c Z		186 a :		154 a c Z	
27	;	59 ;	27 e ESC		187 a ;			
28	<	60 <	28 ec -		188 a <		156 es DEL	
29	=	61 =	29 ec =		189 a =		157 es INS	
30	>	62 >	30 ec +		190 a >		158 ec TAB	
31	?	63 ?	31 ec *		191 a ?		159 es TAB	
32	@	64 @	96 c .		192 a @		224 a c .	
33	A	65 A	97 a		193 a A		225 a a	
34	B	66 B	98 b		194 a B		226 a b	
35	C	67 C	99 c		195 a C		227 a c	
36	D	68 D	100 d		196 a D		228 a d	
37	E	69 E	101 e		197 a E		229 a e	
38	F	70 F	102 f		198 a F		230 a f	
39	G	71 G	103 g		199 a G		231 a g	
40	H	72 H	104 h		200 a H		232 a h	
41	I	73 I	105 i		201 a I		233 a i	
42	J	74 J	106 j		202 a J		234 a j	
43	K	75 K	107 k		203 a K		235 a k	
44	L	76 L	108 l		204 a L		236 a l	
45	M	77 M	109 m		205 a M		237 a m	
46	N	78 N	110 n		206 a N		238 a n	
47	O	79 O	111 o		207 a O		239 a o	
48	P	80 P	112 p		208 a P		240 a p	
49	Q	81 Q	113 q		209 a Q		241 a q	
50	R	82 R	114 r		210 a R		242 a r	
51	S	83 S	115 s		211 a S		243 a s	
52	T	84 T	116 t		212 a T		244 a t	
53	U	85 U	117 u		213 a U		245 a u	
54	V	86 V	118 v		214 a V		246 a v	
55	W	87 W	119 w		215 a W		247 a w	
56	X	88 X	120 x		216 a X		248 a x	
57	Y	89 Y	121 y		217 a Y		249 a y	
58	Z	90 Z	122 z		218 a Z		250 a z	
59	[	91 [	123 c ;		219 a [		251 a c ;	
60	\	92 \	124		220 a \		252 a	
61	]	93]	125 es CLR		221 a]		253 ec 2	
62	^	94 ^	126 e DEL		222 a ^		254 ec DEL	
63	_	95 _	127 e TAB		223 a _		255 ec INS	

CONTROL CHARACTER DISPLAY

ASC	Function	aec	Key	Display
27	escape	e	ESC	
28	cursor up	ec	-	
29	cursor down	ec	=	
30	cursor left	ec	+	
31	cursor right	ec	*	
125	clear screen	es	CLR	
126	back space	e	DEL	
127	tab	e	TAB	
155	return		RTN	
156	delete line	es	DEL	
157	insert line	es	INS	
158	clear tab	ec	TAB	
159	set tab	es	TAB	
253	bell	ec	2	
254	delete char	ec	DEL	
255	insert char	ec	INS	

KEYBOARD INTERNAL CODES (PEEK(764))

Key Cap	Normal	SHIFT	CNTL	SHIFT CNTL	Key Cap	Normal	SHIFT	CNTL	SHIFT CNTL
A	63	127	191	255	Ø	50	114	178	242
B	21	85	149		1	31	95		223
C	18	82	146		2	30	94	158	222
D	58	122	186	250	3	26	90	154	218
E	42	106	170	234	4	24	88	152	216
F	56	120	184	248	5	29	93	157	221
G	61	125	189	253	6	27	91	155	219
H	57	121	185	249	7	51	115	179	243
I	13	77	141	205	8	53	117	181	245
J	1	65	129		9	48	112	176	240
K	5	69	133		+	6	70	134	
L	0	64	128		-	14	78	142	206
M	37	101	165	229	*	7	71	135	
N	35	99	163	227	/	38	102	166	230
O	8	72	136	200	<	54	118	182	246
P	10	74	138	202	>	55	119	183	247
Q	47	111	175	239	=	15	79	143	207
R	40	104	168	232	.	34	98	162	226
S	62	126	190	254	,	32	96	160	224
T	45	109	173	237	;	2	66	130	
U	11	75	139	203	ESC	28	92	156	220
V	16	80	144		BACKS	52	116	180	244
W	46	110	174	238	TAB	44	108	172	236
X	22	86	150		RETURN	12	76	140	204
Y	43	107	171	235	LOWER	60	124	188	252
Z	23	87	151		ATARI	39	103	167	231
					SPACE	33	97	161	225

HEXADECIMAL COLUMNS

4	3	2	1
HEX = DEC	HEX = DEC	HEX = DEC	HEX = DEC
0 0	0 0	0 0	0 0
1 4,096	1 256	1 16	1 1
2 8,192	2 512	2 32	2 2
3 12,288	3 768	3 48	3 3
4 16,384	4 1,024	4 64	4 4
5 20,480	5 1,280	5 80	5 5
6 24,576	6 1,536	6 96	6 6
7 28,672	7 1,792	7 112	7 7
8 32,768	8 2,048	8 128	8 8
9 36,864	9 2,304	9 144	9 9
A 40,960	A 2,560	A 160	A 10
B 45,056	B 2,816	B 176	B 11
C 49,152	C 3,072	C 192	C 12
D 53,248	D 3,328	D 208	D 13
E 57,344	E 3,584	E 224	E 14
F 61,440	F 3,840	F 240	F 15

GRAPHIC MODE SPECIFICATIONS

Basic GRAPHICS Mode	Internal Mode (Hex)	Screen Size (GR Points or Char)			GR Point Size		Bytes/Line	Color Bits	Basic COLOR Value	Basic SETCOLOR	Color Bit Values	Color Register	Register Assignment	Total RAM Requirement Full Split	Char Set Size	Bytes/Char Set
		Type	Hor	Vert	Hor (clocks)	Vert (scans)										
0	2	TEXT	40	24	4	8	40	Bit 7	ATASCII Value	1 2 4		PF1 PF2 BAK	char luminance background; char color border	992	128	1024
1	6	TEXT	20	24	8	8	20	6 & 7	ATASCII Value	0 1 2 3 4	00 01 10 11	PF0 PF1 PF2 PF3 BAK	characters characters characters characters background/border	672 674	64	512
2	7	TEXT	20	12	8	16	20	6 & 7	ATASCII Value	0 1 2 3 4	00 01 10 11	PF0 PF1 PF2 PF3 BAK	characters characters characters characters background/border	420 424	64	512
3	8	GR	40	24	4	8	10	Bit Pairs	1 2 3 0	0 1 2 4	01 10 11 00	PF0 PF1 PF2 BAK	graphics point graphics point graphics point gr point/border/backgrd	432 434		

GRAPHIC MODE SPECIFICATIONS

Basic GRAPHICS Mode	Internal Mode (Hex)	Screen Size (GR Points or Char)			GR Point Size		Bytes/Line	Color Bits	Basic COLOR	Basic SETCOLOR	Color Bit Values	Color Register	Register Assignment	Total RAM Requirement	Char Set Size	Bytes/Char Set
		Mode Type	Hor	Vert	Hor (clocks)	Vert (scans)								Full Split		
4	9	GR	80	48	40	2	4	10	Single Bits	1 0	0 4	1 0	graphics point gr point/border/backgrd	696 694		
5	A	GR	80	48	40	2	4	20	Bit Pairs	1 2 3 0	0 1 2 4	01 10 11 00	graphics point graphics point graphics point gr point/border/backgrd	1176 1174		
6	B	GR	160	96	80	1	2	20	Single Bits	1 0	0 4	1 0	graphics point gr point/border/backgrd	2184 2174		
7 (7+)	D E	GR GR	160 160	96 192	80 160	1 1	2 1	40 40	Bit Pairs	1 2 3 0	0 1 2 4	01 10 11 00	graphics point graphics point graphics point gr point/border/backgrd	4200 4190 8138 8112		
8	F	GR	320	192	160	1/2	1	40	Single Bits	1 0	1 2 4	1 0	gr point luminance gr point/background border	8138 8112		